

Aalborg Universitet



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"Progression of District Heating – 1st to 4th generation"

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Energy efficiency / temperature level

1G: STEAM

Steam system, steam pipes
in concrete ducts

DH flow < 200 °C

DH return < 80 °C

Energy efficiency

District heating grid

1G / 1880-1930

2G: IN SITU

Pressurised hot-water system
Heavy equipment
Large "build on site" stations

> 100 °C

< 70 °C

2G / 1930-1980

3G: PREFABRICATED

Pre-insulated pipes
Industrialised compact
substations (also with insulation)
Metering and monitoring

< 100 °C

< 45 °C

3G / 1980-2020

4G: 4th GENERATION

Low energy demands
Smart energy (optimum
interaction of energy
sources, distribution
and consumption)
2-way DH

50-60 °C (70 °C)
(ULTDH < 50 °C)

~ 25 °C

4G / 2020-2050

Development
(District Heating generation) /
Period of best
available technology

Steam
storage

Coal
Waste

Local District Heating

CHP coal
CHP oil

Coal
Waste

District Heating

Gas, Waste
Oil, Coal

District Heating

CHP waste
incineration

District Heating

Also low energy
buildings

Data center

Seasonal
heat storage

Large scale solar

Geothermal

PV, Wave
Wind surplus
Electricity

Heat
storage

Industry surplus

Future
energy
source

Biomass
conversion

2-way
District
Heating
e.g. supermarket

CHP
biomass

Centralised
district
cooling plant

Centralised
heat pump

Cold
storage

District cooling grid